

What is claimed is:

1) A fuel transfer coupling that is adapted to be attached to the inlet pipe of a vehicle's fuel tank, which coupling comprises:

- 5 a) a base portion which comprises a top surface and a central bore portion having a first end portion and a second end portion, wherein the central bore portion is surrounded by a shrouding enclosure, wherein the shrouding enclosure includes a vapor tube, wherein said shrouding enclosure is in fluid communication with a plurality of holes disposed on said top surface, thus providing fluid
- 10 communication between said holes and said vapor tube, said base portion further including a circumferential ledge at the terminus of said second end portion within said base portion, and an adjacent wall portion, and wherein said base portion further comprises a flange disposed about its periphery, said flange including a plurality of holes in its surface;
- 15 b) a flow control cone having a conically-shaped cone element, said flow control cone including a spring seat, a poppet guide bore, and an outer ring portion including a wall portion, wherein said flow control cone is disposed at the second end portion of said central bore portion with its outer ring in contact with said circumferential ledge, thus forming a circumferential slot between the wall
- 20 adjacent to said circumferential ledge and said wall portion of said flow control cone;
- c) a poppet having a top surface, a bottom surface, and a stem, wherein said stem is slidably disposed within said poppet guide bore, said poppet further comprising

a vent disc centrally and depressably disposed on said top surface, wherein said vent disc is mechanically biased towards said flat top surface;

d) a spring disposed between said spring seat and the bottom surface of said poppet;

5 e) a hollow internal housing having a flat top surface and a skirt portion, said internal housing being disposed about said poppet and wherein said the skirt of said internal housing is slidably disposed within said circumferential slot;

f) an adapter cover affixed to said base portion, in which is contained said flow control cone, said poppet, said spring, and said internal housing, wherein said
10 adapter cover further includes a substantially cylindrically-shaped outer wall portion and a flange comprising a plurality of holes for fastening said flange of said cover to said flange of said base portion.

2) A fuel containment system comprising a fuel reservoir having an inlet pipe and
15 containing a liquid fuel and a headspace, and further comprising the coupling of claim 1, wherein said vapor tube is in effective fluid contact with the headspace above the fuel in said fuel reservoir, and wherein said first end portion of said central bore portion is in effective fluid contact with said inlet pipe.

20 3) A motorized vehicle comprising the fuel containment system according to claim 2.

4) A fuel transfer coupling that is adapted to be attached to the a fuel containment vessel containing fuel to be delivered to a vehicle's fuel tank which comprises:

a) a base portion which comprises a raised surface and which comprises a central conduit portion having a top end portion and a bottom end portion, wherein the central conduit portion is surrounded by a shrouding enclosure, wherein the shrouding enclosure includes a vapor tube and wherein said shrouding enclosure is in fluid communication with a plurality of holes disposed on said raised surface, thus providing fluid communication between said holes and said vapor tube, said base portion further including a flange disposed about its periphery, said flange including a plurality of holes in its surface;

b) a boss centrally located within said central conduit portion, said boss adapted to receive and rigidly hold in place a fastener means;

c) a spring disposed about said top end portion of said central conduit portion;

d) a collar/seal ring assembly comprising:

i) a moveable collar shaped substantially in the form of a cylindrical sleeve having a top portion, a bottom portion, and a circumferential wall and comprising a plurality of slots in its wall;

ii) a seal ring having a flat top surface and being disposed within the inner space defined by the wall of said moveable collar, being held in position therein by means of a plurality of equatorially-located protrusions extending from said seal ring into said plurality of slots on said moveable collar, said plurality of slots further including springs for mechanically

biasing said seal ring in a direction towards the top portion of the
moveable collar in which it is disposed,

wherein said collar/seal ring assembly is in contact with said spring;

e) a valve center having a flat top portion and a stem portion having a tip, wherein
5 said tip of said valve center includes a means for receiving a fastener means,
wherein said means for receiving a fastener means is mechanically engaged with said
fastener means in said boss; and

f) an adapter cover shaped substantially in the form of a cylindrical sleeve affixed
to said base portion, in which is contained said spring, said collar/seal ring assembly, and
10 said valve center, wherein said adapter cover includes a smooth bore in its inner wall, and
wherein the bottom includes a plurality of holes for fastening said cover to said flange of
said base portion.

5) A fuel containment vessel comprising an outlet and containing a liquid fuel and a
15 headspace, and further comprising the coupling of claim 4, wherein said vapor tube is in
effective fluid contact with the headspace above the fuel in said fuel containment vessel,
and wherein said central conduit portion is in effective fluid contact with said outlet pipe.

6) A fuel containment vessel according to claim 6 further comprising a valve means
20 disposed between said outlet and said central conduit portion.

7) A coupling pair through which a liquid hydrocarbon fuel may flow comprising a coupling according to claim 1 in effective contact with a coupling according to claim 4, such that said outer wall of the male adapter portion of the coupling of claim 1 is disposed within said female adapter cover of the coupling of claim 4.

5

8) A process for charging a fuel reservoir on board of a motorized vehicle from a remote reservoir, wherein the vapor in the fuel reservoir is displaced by an equal volume of fuel delivered from said remote reservoir, and wherein the vapor in said fuel reservoir is simultaneously caused to be transferred to said remote reservoir, thus permitting no escape of the vapor from said fuel reservoir to the surrounding atmosphere.

10

9) A process according to claim 8 wherein the total amount of fuel spillage during said charging is less than 50 milliliters of fuel.

10) A process according to claim 8 wherein simultaneous exchange of the fuel in the remote reservoir with the vapor in the fuel reservoir on board of said motorized vehicle occurs through a single pair of couplings, wherein one coupling of said pair of couplings is disposed on said vehicle, and wherein the remaining coupling of said pair of couplings is disposed on said remote reservoir.

15

20

11) A process for charging a fuel reservoir on board of a motorized vehicle from a remote reservoir, wherein the vapor in the fuel reservoir is displaced by an equal volume of fuel delivered from said remote reservoir, and wherein the vapor in said fuel reservoir is simultaneously caused to be transferred to said remote reservoir, thus permitting no escape of the vapor from said fuel reservoir to the surrounding atmosphere, wherein said process includes the use of a coupling according to claim 1 in effective contact with a coupling according to claim 4, such that said outer wall of the male adapter portion of the coupling of claim 1 is disposed within said female adapter cover of the coupling of claim 4.

12) A process according to claim 11 wherein the flow of fuel from said remote reservoir to said fuel reservoir on board of said motorized vehicle is stopped by virtue of the decoupling of the coupling pair comprising the coupling according to claim 1 and the coupling according to claim 4.

13) A quick-detach fuel transfer coupling through which a liquid fuel may pass from a remote charging reservoir to a vehicle's on-board fuel tank which comprises:

a) an on-board portion having an inlet end and a discharge end, wherein said discharge end is in fluid communication with the inlet pipe of a vehicle's on-board fuel tank, which comprises:

i) a substantially-cylindrically shaped first adapter portion comprising an outer wall disposed about a central bore, said outer wall having a central axis;

ii) means for permitting a liquid fuel to pass into said fuel tank via a path which is annularly disposed about said central axis;

iii) means for permitting vapor from within said fuel tank to exit said fuel tank via a path which is annularly disposed about said central axis;

b) a remote portion having an inlet end and a discharge end, wherein said inlet end is in fluid communication with a remote charging reservoir which comprises:

i) a substantially-cylindrically shaped second adapter portion comprising a smooth bore disposed about a central bore, said smooth bore having a central axis;

ii) means for permitting flow of a liquid fuel from said remote charging reservoir to said on-board portion upon placement of said smooth bore over said outer wall via a path which is annularly disposed about said central axis;

iii) means for permitting vapor from within said fuel tank to enter said remote charging reservoir via a path which is annularly disposed about said central axis,

wherein said central axis of said first adapter coincides substantially with said central axis
5 of said second adapter.

14) A coupling according to claim 13 wherein said on-board portion further comprises:

iv) a means for maintaining pressure within said fuel tank at a level equal to ambient pressure.

10